INNOVATING CROSS-DOMAIN SOLUTIONS TO DETECT EMERGING BIOLOGICAL THREATS

The Development Of A Portfolio Of Antibodies To Facilitate The Point-of-need Detection Of Bacterial, Viral, And Toxin Biothreats

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Biothreat preparedness is of great concern to defense operations, as well as society as a whole. Successful response to an exposure requires the ability to provide a timely and accurate diagnosis. Many existing diagnostic assays require hours and sometimes days to generate results, delaying initiation of proper care and increasing the potential for negative outcomes. There is a need for either new or improved rapid diagnostic tests (RDTs) for detection of numerous biological threats. A leading platform for RDTs is the lateral flow immunoassay (LFI). LFIs offer rapid results, high specificity, require minimal infrastructure and are low cost. Furthermore, the compact nature and stability of the tests are advantageous when implementing into the workflow at the point-of-need (PON). The AuCoin laboratory at the University of Nevada, Reno has years of experience developing monoclonal antibody (mAb) libraries to Select Agent pathogens. Ongoing studies include evaluation, down-selection, and validation of mAb pairs utilizing both AuCoin laboratory generated mAbs as well as those provided by collaborators. These mAb pairs have been applied in LFIs and other PON diagnostics such as the vertical flow immunoassay. Immunoassays have been developed for a panel of bacterial and viral pathogens, as well as a panel of toxins. This portfolio includes biothreats of concern such as Francisella tularensis, Rift Valley fever virus, ricin toxin, and Staphylococcus enterotoxin B. Research efforts continue to focus on ways to increase assay sensitivity, including alternative detection molecules and biomarker concentration protocols. The mAbs and PON immunoassays developed as a part of this research are directly aligned with JSTO's mission to innovate diagnostics to detect emerging biological threats. This work can be utilized to improve existing bio-surveillance methods and further support the warfighter.